19. Derive the rate constant of a bimolecular reaction using ARRT.

20. Explain how the rate constant of the catalyzed reaction depends on the pH using suitable graphs.

Shanmuga Industries Arts & Science College
T.V.Malai

APRIL/MAY 2025

GCH13/DCH13 — PHYSICAL CHEMISTRY – I

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. How does the partial molar free energy deviate from other thermodynamic properties?

2. How does the fugacity of a real gas deviate from the ideal one?

3. What is an incongruent melting point?

4. Draw a plaint point of phase diagram and explain.

5. What is Zeta Potential?

6. Recall gold number.

7. What is meant by activation energy?

8. Define electrostriction.

9. Define catalytic poisons.

10. What is turnover number in catalysis?

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) What is meant by fugacity? Determine the fugacity by graphical method.'

Or

(b) Account on Partial Molar properties.

12. (a) Explain a congruent melting point in the context of a two-component system as a suitable example.

Or

(b) Discuss the phase behavior of a system with acetic acid, chloroform, and water. focusing on their partial miscibility.

13. (a) Discuss the surfactant structure impact on critical micelle concentration in aqueous media.

Or

(b) Compare the sedimentation potential and streaming potential.

14. (a) Derive the Eyring equation.

Or

(b) Describe the Hammett equation and how it provides the mechanism of chemical reaction.

15. (a) Derive the Michaelis-Menten equation.

Or

(b) What is non-competitive inhibition, and how does it differ from competitive inhibition?

Sharanbasva Industries Arts & Science College T.V.Malai

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Determine the activity and activity coefficients by the EMF method.

17. Describe the solid-liquid equilibrium in the system of sodium chloride, sodium sulfate. and water, emphasizing hydrate formation.

18. Explain the electrophoresis and electro-osmosis with suitable experiments.